CHEMICAL & ENGINEERING NEWS

C&EN

SEPTEMBER 7, 1992

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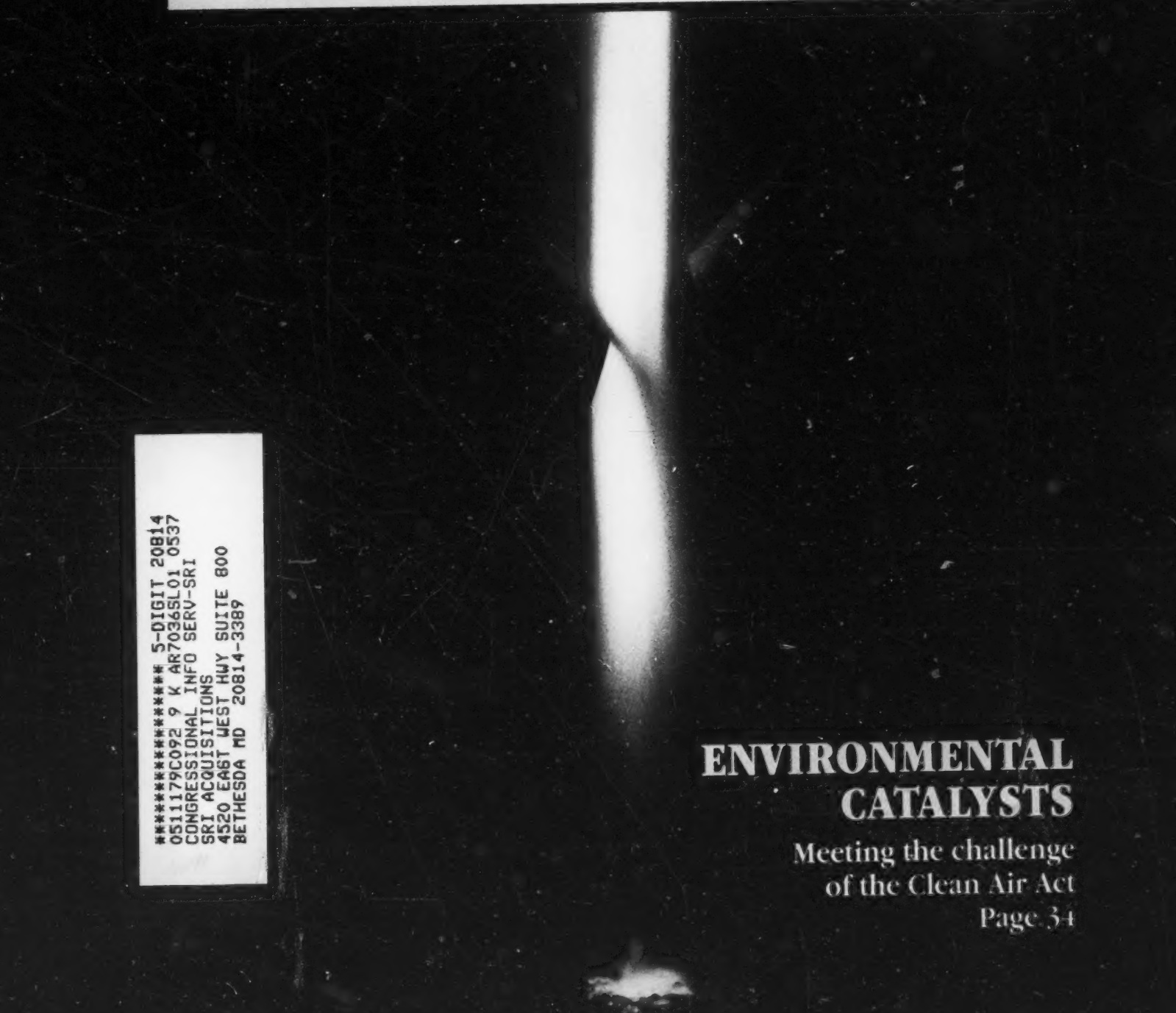
ICI HEADS LIST OF GLOBAL TOP 50 CHEMICAL PRODUCERS PAGE 17



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Meeting the challenge of the Clean Air Act

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CHEMICAL & ENGINEERING NEWS

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SEPTEMBER 7, 1992

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■ Giant fullerene cages are formed by coalescence of hot, dense C_{60} and C_{70} vapors in research that may open up new routes to synthesis of large fullerenes. Page 6

■ UN Conference on Disarmament sends landmark chemical weapons treaty to UN General Assembly for approval in October. Page 6

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Strong growth is likely in the 1990s for environmental catalysts that reduce air pollutants such as carbon monoxide, volatile organic compounds, and nitrogen oxides, as the result of recently enacted amendments to the Clean Air Act. Page 34

COVER: Catalyst microspheres exit calciner at 2100 °F; such catalysts for fluid catalytic cracking will help petroleum refiners meet requirements of Clean Air Act. Photo courtesy of Engelhard

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LETTERS

Political science

After reading the lead article "Big Science Funding: Big wins for SSC and space station" (C&EN, Aug. 10, page 3), I have to say that C&EN overlooked something that all the other media overlook. The title misleads the reader into thinking that either the Superconducting Super Collider or the space station is big science. They are more rightly big engineering, something quite different, and if science results from either, that is a bonus.

As to my support for either, I tend to side with the cancellation crowds, but for entirely different reasons, as far as I can tell. In principle, I like both. But these "giga-projects" have been driven too heavily by politics at the expense of engineering and science, taking secondary and tertiary roles, respectively. The debate, as portrayed in most media, resembles a trial in which both sides send their expert witnesses to do battle. One side claims the large spin-off potential, the other, the waste of scarce federal dollars on a project of questionable benefits. The peer-review process—a better, if still less than perfect, process by which we best judge science—gets scrapped. Insofar as this represents the norm, it should trigger alarm bells.

For instance, when the SSC-siting process took place around the last Presidential election, major political players included George Bush, James Baker, Lloyd Bentsen, Phil Gramm, Ann Richards, the late John Tower, and Jim Wright. (Please note both Democrats and Republicans in this list.) Should anyone be surprised that the SSC landed in Waxahachie, Tex.? If Paul Simon (Senator, not singer) had been the Democratic Presidential candidate with Dan Rostenkowski (very hypothetical) as his running mate, would the SSC have been located at Fermilab, a site arguably superior to Waxahachie? (No, I have never even been to the Chicago area, other than inside O'Hare Airport.) I do not know, but I suspect that it would have been better situated, politically that is. But whatever the outcome, such political interference taints the scientific endeavor. Moreover, in terms of expected discoveries and particle production, the present SSC design promises less than the original version that garnered such widespread scientific and political support. In this sense, the phrase "bait-and-switch" comes to mind.

Similarly, space station *Freedom* receives much political backing from the National Space Council, located in the Old Executive Office Building where its chairman works. When one considers that such space council leadership nicely pads the political résumé of a potential Presidential candidate, one should not be surprised that the space station will not die easily (if at all), even (or perhaps especially) in its virtually scienceless form.

If these examples typify federal science to come, the science and engineering communities had better preempt further procedural deterioration of federally funded science by devising an open review process that both safeguards scientific integrity and sustains political support without sending the unwelcome message: We know science; trust us with [y]our federal dollars.

David L. Wagger
AAAS Science, Engineering, and Diplomacy Fellow
Arlington, Va.

Leave it to the experts

The letter by H. A. Kjellman, entitled "Science Cacophony" (C&EN, June 1, page 3), deplores that many contradictory voices claim truth on scientific matters, creating a "modern-day Tower of Babel." It is my purpose to draw a little map of Babel.

Within the confines of this letter, let us divide the world into scientists or "experts," and nonexperts. The media and the publicists informing the public about scientific matters are expert in journalism, TV, and communication but generally nonexpert in science. Even if they comprehend, their audience or their agenda requires simplification beyond expert recognition. The public is eager to know but likewise generally nonexpert in science. Can nonexperts communicate an alien expertise?

Although Descartes is not popular with the media, I will slightly rearrange a Cartesian dictum (Discourse on Method, Part I): Nonexperts, ignorant of mathematics and logic, base their arguments upon authorities that are ancient and outmoded. Although including the best

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Shifts in Rankings, Losses Mark Global Top 50 List

■ ***Global group's 1991 sales dip to $314 billion, a 2% drop from 1990, as business, political climates curb industry***

Patricia L. Layman, C&EN London

This year's annual C&EN ranking of the world's 50 largest chemical producers shows that 1991 was a year marked by slowing sales and weak prices that put a dent in operating profits, by a strong dollar compared with the year before, and by some shifts in rankings including one dramatic tumble.

The global listing uses the same criteria as C&EN's ranking of the 100 largest U.S. chemical producers (C&EN, May 11, page 13). Wherever possible, it excludes formulated products such as coatings, pharmaceuticals, consumer products, and nonchemical operations such as specialty equipment and energy.

Chemical sales rung up by the Top 50 companies in 1991 totaled $314 billion, a decline of about 2% from 1990. Several factors accounted for the decline: the relatively strong dollar, for one, adversely affected chemical sales translated into dollars, especially when compared with the effect that that same conversion had on balance sheets in 1990. Another factor was the continuing shift in company portfolios to higher value-added formulated products—such as pharmaceuticals, coatings, and detergents—that lowered the actual chemical sales.

In 1991, moreover, external factors added hurdles. The first half of the year, for example, was marked by the war in the Persian Gulf. Disruption of markets and production were primarily the cause of the 34% decline in sales shown by Saudi Basic Industries in 1991 from 1990, a tumble that dropped the company out of the Top 50 altogether.

If slowing economies were starting to curb sales, then overcapacity—a growing global problem—began having a serious adverse effect on the selling prices of a host of chemical products in 1991. Producers of petrochemicals and other basic chemicals felt the impact of this effect most severely, with operating profit margins shrinking. Two producers—the U.K.'s BP Chemicals' and Norway's Norsk Hydro's chemicals operations—had operating losses for the year, and the picture was only slightly better, albeit profitable, at a number of other petrochemical producers.

Overcapacity—a growing global problem—began having an adverse effect on chemical selling prices

German chemical companies—six of the Top 50, including three of the five largest—account for 21% of the total sales, $65.4 billion. The U.S. continues to have the largest number of companies among the 50, at 15. However, that is a decline of one from last year, and a drop of three from two years ago, when C&EN began its rankings.

Although Europe as a block fields the largest number of companies (24) in the Top 50, the largest individual nation represented in the rankings, next to the U.S., is Japan, with 11 companies on the list. The same 11 companies are on the list this year as last year, but several have advanced in the standings. Moreover, their share of total chemical sales has risen to 15% of the total, or $48.2 billion, from 14% the year before.

The 1991 list shows Union Carbide at 22nd, down from 13th in 1990. The drop reflects the company's split into Union Carbide and the industrial gases supplier Praxair, which would be placed on an expanded listing at number 51. Similarly, because U.K.'s ICI has announced that it is considering a split in its operations—a split virtually certain to take place—into ICI, a chemical company, and ICI Bioscience (C&EN, Aug. 10, page 5), next year's listing undoubtedly will reflect a major change at the very top.

The British chemicals giant has been working to increase the percentage of its sales accounted for by higher value-added products, such as pharmaceuticals and coatings. Notwithstanding that continuing effort, however, ICI has emerged as the largest producer in the C&EN rankings with a higher percentage of chemical sales than any of its four major competitors—BASF, Hoechst, and Bayer of Germany, and Du Pont of the U.S.

Should the split proceed as expected, ICI, by C&EN criteria, still would be solidly among the 10 largest producers, but no longer in the top five. ICI Bioscience probably would not make the cutoff for the Top 50 ranking.

In many respects, the ICI action simply will take to extremes the portfolio reshuffling going on throughout the chemical industry—companies trying to sell "noncore" operations, so as to devote resources and attention to a controlled number of businesses. Although other mega-chemical producers might find the idea of a split appealing, in many cases, the tax law and other laws of individual countries might make such a course of action totally impossible. German tax law, for example, would make a split such as that proposed by ICI impossible.

Stock market analysts accept the existence of such strictures, but only reluctantly. Very rarely, they argue, do the synergies once fashionably cited as encouraging a company to maintain various chemically related interests re-

Chemical sales of global Top 50 total more than $300 billion

Rank 1991	Rank 1990		Chemical sales ($ millions)	Chemical sales as % of total sales	Chemical operating profits ($ millions)	Chemical operating profits as % of sales
1	3	ICI (U.K.)	$18,127	77.6%	$ 621	3.4%
2	1	BASF (Germany)	17,951	63.8	1081	6.0
3	2	Hoechst (Germany)	17,825	62.7	814	4.6
4	4	Bayer (Germany)	16,066	62.9	690	4.3
5	5	Du Pont (U.S.)	15,383	39.8	1265	8.2
6	6	Dow Chemical (U.S.)	13,277	70.6	835	6.3
7	8	Shell (U.K., Netherlands)	11,239	10.9	41	0.3
8	7	ENI (Italy)	10,817	26.4	62	0.5
9	10	Rhône-Poulenc (France)	9,422	63.4	472	5.0
10	12	Ciba-Geigy (Switzerland)	9,268	62.9	599	6.5
11	9	Exxon (U.S.)	9,171	7.9	512	5.6
12	11	Elf Aquitaine (France)	8,865	24.9	559	6.3
13	14	Asahi Chemical[a] (Japan)	7,249	100.0	218[b]	na
14	15	Veba (Hüls) (Germany)	6,183	29.4	81	1.3
15	17	Monsanto (U.S.)	5,451	61.5	694	12.7
16	19	British Petroleum (U.K.)	5,423	8.2	–12	-
17	20	Mitsubishi Kasei[a] (Japan)	5,408	100.0	40[b]	na
18	16	Akzo (Netherlands)	5,347	59.3	230	4.3
19	24	Sumitomo Chemical (Japan)	5,214	100.0	113[b]	na
20	18	DSM (Netherlands)	4,998	98.6	337	6.7
21	21	Solvay (Belgium)	4,996	67.2	355	7.1
22	13	Union Carbide[c] (U.S.)	4,877	100.0	599	6.5
23	26	Sekisui Chemical (Japan)	4,833	100.0	158[b]	na
24	22	General Electric (U.S.)	4,722	7.8	803	17.0
25	25	Norsk Hydro (Norway)	4,703	49.6	–33	-
26	—	Air Liquide (France)	4,688	83.1	na	na
27	23	Occidental Petroleum (U.S.)	4,649	40.4	53	1.1
28	—	Henkel (Germany)	4,580	59.0	243	5.3
29	—	BOC[d] (U.K.)	4,531	90.0	628	13.9
30	29	Toray Industries[a] (Japan)	4,455	100.0	202[b]	na
31	30	Showa Denko (Japan)	4,289	100.0	1[b]	na
32	31	Takeda Chemical[a] (Japan)	4,171	100.0	241[b]	na
33	28	Mobil (U.S.)	3,953	6.3	245	6.2
34	27	Amoco (U.S.)	3,893	13.8	56	1.4
35	35	Dainippon Ink & Chemicals[a] (Japan)	3,848	100.0	59[b]	na
36	36	Roche (Switzerland)	3,817	47.7	na	na
37	33	Eastman Kodak (U.S.)	3,740	19.3	538	14.4
38	34	W. R. Grace (U.S.)	3,531	58.4	426	12.1
39	—	Total (France)	3,227	12.7	264	8.2
40	39	Unilever (U.K., Netherlands)	3,172	7.7	393	12.4
41	40	Mitsui Toatsu Chemicals[a] (Japan)	3,140	100.0	53[b]	na
42	37	Chevron (U.S.)	3,098	7.7	196	6.3
43	41	Mitsubishi Petrochemical[a] (Japan)	3,025	100.0	115[b]	na
44	43	Arco Chemical (U.S.)	2,837	100.0	398	14.0
45	44	Rohm & Haas (U.S.)	2,763	100.0	327	11.8
46	42	Degussa[d] (Germany)	2,762	34.3	na	na
47	46	Air Products[d] (U.S.)	2,676	91.3	474	17.7
48	—	Nobel Industries (Sweden)	2,621	64.2	198	7.5
49	—	Montedison (Italy)	2,618	20.7	293	11.2
50	50	Teijin[a] (Japan)	2,522	100.0	111[b]	na

Note: Listing includes chemical sales only, so as to facilitate comparison with C&EN's Top 100 list (May 11, page 13). Excluded where possible are formulated products such as coatings, pharmaceuticals, and adhesives, and specialty equipment, energy, and other nonchemical operations. **a** Fiscal year ends March 31. **b** Net profits. **c** Following split into Union Carbide and Praxair. **d** Fiscal year ends Sept. 30. **na** = not available.

ally work to the advantage of the shareholder. On the other hand, the higher profit margins shown by many U.S. chemical companies, earned in an environment less constricted in terms of buying and selling businesses, do filter through to the shareholder.

Analysts also argue that, to some extent, there may be a natural limit to the size of an effectively managed company that provides good value to shareholders. No one wants to put a number on that limit, which would vary in any case. But small- to medium-sized companies, they insist, are more able to move quickly, make more sensible business decisions, and know their markets and customers better than the management of very large companies.

Says one mergers and acquisitions specialist: "One of the things we've found we've had to deal with is half a dozen people, rather than just one decisionmaker. In the big companies, people often just don't know what's going on—the quality of the management, whether a business is truly profitable, and so on. They often make crazy business decisions that will never be repaid."

In some businesses, of course, size is crucial. There is less room in the petrochemical industry for smaller producers, for example, because of the sheer size of capital investment required for new projects. To establish a stake in the pharmaceuticals business or agricultural chemicals sector also takes significant investment in research and development.

All too frequently, however, economies of scale also bring pitfalls such as layers of management and loss of flexibility to customize service and orders. That can mean opportunity for the small- to medium-sized company, such as those with sales rosters between $1 billion and $2 billion, many of which are located in the U.S.

Splitting up of entire companies is relatively rare, but selling off operations while snapping up small strategic acquisitions is well on its way in the U.S., and is being seen more frequently in Europe. However, because of the general state of the global economy, points out one stock analyst, "it's an odd market at the moment. People want to sell their noncore businesses, but they don't want a cheap price."

No fire sales, not many bargain prices. And bar an extraordinary example like ICI, not that much change in the cards for next year's Top 50 ranking. □